

Changes in biotic and abiotic factors affect the life history of many organisms by altering their performance, fitness and distribution. In the Gulf of Maine, the calanoid *Calanus finmarchicus* often co-occurs with blooms of the saxitoxin-producing dinoflagellate *Alexandrium fundyense*. High-throughput sequencing was used to quantify gene expression in late nauplii (NV-NVI) of *C. finmarchicus* after two days of feeding on either *A. fundyense* or on a control diet of *Rhodomonas* sp. Similar to adult females, the *A. fundyense* diet had no effect on survival of the nauplii but a large number of transcripts were differentially expressed between control and experimental nauplii. The transcriptomic response, with 800 differentially expressed genes, was very different from the one reported for adult females. Although a cellular stress response was observed in the nauplii, only 96 differentially-expressed genes were shared between adult females and nauplii. A large number of genes coding for proteins involved in tissue build up (cytoskeleton elements, exoskeleton, cuticle) and motor activity (myosin, tropomyosin) were up-regulated in nauplii, but not in adult females. In addition, experimental nauplii showed low motility compared with control nauplii, and the up-regulation of genes involved in muscle function in nauplii feeding on *A. fundyense* may be compensatory. Overall, the physiological response observed in nauplii suggests that the presence of blooms of the dinoflagellate *A. fundyense* could affect naupliar growth. However, further studies are needed to quantify the physiological effect over longer time periods and at lower doses of the dinoflagellate.